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(54) An implement for milking animals.

(57) In an implement for milking animals, such as cows, the milking parlour is provided with a fixedly arranged frame (3) at at least one of its longitudinal sides. This frame (3) includes an upper frame portion (4), to which a milking robot for the automatic milking of animals is movably connected, and a lower frame portion (5), against which the milking robot (8) bears. Arms (37) of the milking robot are movable along the bottom side of this lower frame portion (5) under the animal present in the milking parlour.

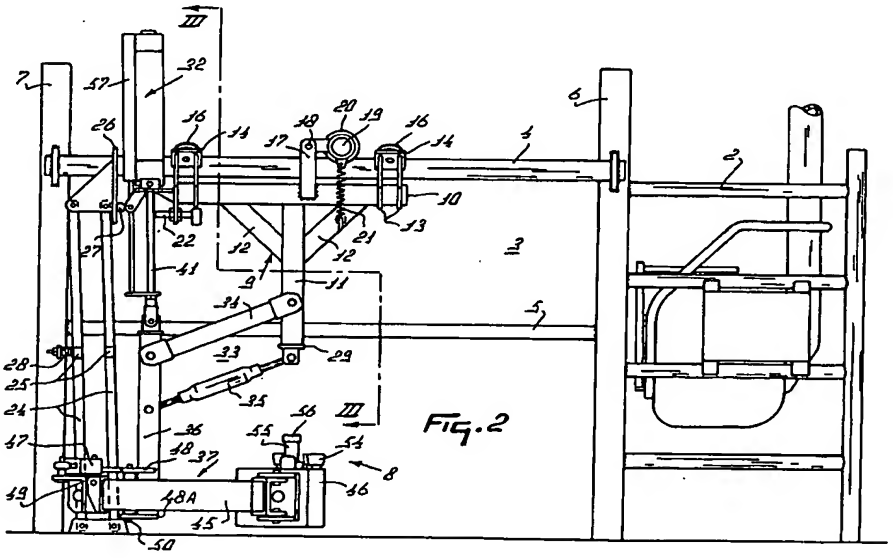

Fig.2

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The present invention relates to an implement for milking animals, such as cows, comprising a milking parlour and a milking robot for the automatic milking of animals, as well as a straight guide arranged in the longitudinal direction at the side of said milking parlour, the milking robot being movable along said straight guide.

Such an implement is commonly known. In such a construction, the milking robot bears on one straight guide arranged in the longitudinal direction of the milking parlour. This straight guide is disadvantageous in that under certain conditions there is question of an insufficient transverse stability of the milking robot. To avoid this problem, according to the invention, the above-defined implement is characterized in that the straight guide, seen in plan view, includes two guide elements arranged above the ground some distance from each other.

In accordance with a further feature of the invention, the two guide elements are located substantially above the ground, and the milking robot bears on the two guide elements. In accordance with a further feature of the invention, the milking robot, seen in the vertical direction, is arranged more closely to the ground than the guide elements.

In accordance with a still further feature of the invention, the guide elements, seen in the vertical direction, are arranged at some distance from the ground. This is advantageous in that it results in a less quick fouling of the guide elements, so that the occurrence of interruptions in the movement of the milking robot in the longitudinal direction of the milking parlour is restricted.

In accordance with a further feature of the invention, the guide elements include a first frame portion and a second frame portion of a frame disposed near a longitudinal side of the milking parlour.

Therefore, the invention in particular relates to an implement for milking animals, such as cows, comprising a milking parlour and a milking robot for the automatic milking of animals, as well as a straight guide arranged in the longitudinal direction beside said milking parlour, along which straight guide the milking robot is movable, characterized in that along at least one longitudinal side of the milking parlour there is arranged a fixed frame including a first frame portion, to which the milking robot is connected movably, and a second frame portion, against which the milking robot bears and along whose bottom side milking robot arms are movable under the animal present in the milking parlour. More in particular, the first frame portion extends parallel to the second frame portion and is located predominantly thereabove. As a result, there is obtained a spatially advantageous construction, in which the frame portions do not constitute an obstacle to the milking robot arms. In accordance with the invention, the milking robot includes a carrier frame for the further portions of the milking robot and the upper frame portion is constituted by a rail, along which the carrier frame can be moved with the aid of roller elements. This carrier frame preferably extends from the upper frame portion to approximately the height at which the lower frame portion is located. In a specific embodiment, the carrier frame is moved by means of a motor provided thereon and a roller driven by this motor along the upper frame portion. The lower frame portion may also be constituted by a rail, in which case the carrier frame of the milking robot is provided with a roller element, by means of which the carrier frame, when it is moved along the upper frame portion, bears also on the lower frame portion.

In accordance with a further feature of the invention, the milking robot includes a sensor, by means of which the milking robot can be directed from a rest position into the longitudinal direction of the milking parlour to a start position, from which the arms of the milking robot are moved to under the animal present in the milking parlour, and the movements of the animal in the longitudinal direction of the milking parlour can be followed. Therefore, the invention also relates to an implement for milking animals, such as cows, comprising a milking parlour and a milking robot for the automatic milking of animals, characterized in that the milking robot includes a sensor, by means of which the milking robot can be directed from a rest position into the longitudinal direction of the milking parlour to a start position, from which the arms of the milking robot are moved to under the animal present in the milking parlour, and the movements of the animal in the longitudinal direction of the milking parlour can be followed. More particularly, for that purpose there is provided a supporting element which is movable against the rear side of the animal and can cooperate with the sensor, i.e. in such a manner that, when the animal moves in the longitudinal direction of the milking parlour, the supporting element is moved along and consequently, while preserving the supporting element-to-sensor distance in the longitudinal direction, the milking robot. In a concrete embodiment, the supporting element then includes a plate which is disposed such that it laterally extends beyond the frame portions, and from the actual distance between the plate and the sensor there is derived a control signal for the motor to move the milking robot into the longitudinal direction of the milking parlour, with the aid of which control signal the distance between the plate and the sensor is readjusted to a preset value.

In accordance with a further feature of the

invention, the milking robot includes a robot arm construction which is movable in a predominantly vertical direction, e.g. using a quadrangular pivot construction, relative to the carrier frame by means of an operating cylinder, such as a servo-pneumatic positioning cylinder. In this construction, it is advantageous for one of the arms of the quadrangular pivot construction, which forms the connection between the robot arm construction and the carrier frame, to be adjustable in length. Therefore, the invention also relates to an implement for milking animals, such as cows, comprising a milking parlour and a milking robot for the automatic milking of animals, characterized in that the milking robot includes a robot arm construction which is movable in a predominantly vertical direction, e.g. using a quadrangular pivot construction, relative to the carrier frame by means of an operating cylinder, such as a servo-pneumatic positioning cylinder. In a preferred embodiment, the robot construction includes a predominantly vertical robot arm as well as robot arms which are movable in a predominantly horizontal plane. Then, preferably, the operating cylinder is operative between the carrier frame and the predominantly vertical robot arm, while the housing of the operating cylinder preferably will be arranged pivotably on the carrier frame.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 is a plan view of the implement in accordance with the invention, the arms of the milking robot being moved to under an animal present in the milking parlour;

Figure 2 is a side view of the implement shown in Figure 1, the milking robot being in the rest position;

Figures 3 to 8 show in further detail several component parts of the implement illustrated in Figures 1 and 2.

In the plan view of the implement according to Figure 1, a cow 1 is shown standing in the milking parlour, the milking parlour being surrounded by a railing 2 which allows the animal a limited freedom of movement. The animal can enter the milking parlour from a longitudinal side near the rear end, while the animal can leave it again at the same longitudinal side near the front end. As the front end of the milking parlour is provided with a feeding arrangement, the cow will advance sufficiently far to the front and arrive in a position wherein it can be milked easily. At the other longitudinal side of the milking parlour than where the entrance and exit are located, there is mounted a fixedly arranged frame 3, which frame 3 constitutes part of the railing 2 and includes a first frame portion 4 and a second frame portion 5. The first frame portion 4 extends parallel to the second frame portion 5 and is located predominantly thereabove. In this situation, the first frame portion 4 is connected rigidly to the outer side of two vertical posts 6 and 7 which constitute part of the railing 2, whilst the second frame portion 5 is arranged fixedly between these two posts 6 and 7. A milking robot 8 for the automatic milking of animals is connected movably to the first frame portion 4, while this milking robot bears on the second frame portion 5 which further is disposed at such a height that arms of the milking robot 8 can move along the bottom side thereof to under the cow present in the milking parlour. The milking robot 8 includes a carrier frame 9 for the further portions of the milking robot. By implementing the upper frame portion 4 as a rail, the carrier frame 9, and consequently the entire milking robot 8, can easily be moved therealong. The frame portion 9 includes a beam 10 which extends predominantly parallel to the first frame portion 4, a beam 11 which extends perpendicularly to the latter beam in the vertical direction and is rigidly connected thereto and two struts 12. Near the ends of the beam 10 there are arranged pairs of supporting elements 13. Two rollers 16 forming a roller element pair 15 are connected at an angle of approximately 45° to each pair of supporting elements 13 by means of supporting plates 14 rigidly connected thereto, the arrangement being such that the carrier frame 9 is suspended under the upper frame portion 4 capably of easy movement therealong. On the beam 10 of the carrier frame there is arranged at either side thereof a carrier 17. On these carriers there is fitted capably of pivotal movement about a pivot shaft 18 a motor 19. This motor 19 drives a roller 20 which preferably has a rubber surface, the roller being pushed against the upper frame portion 4 by means of a spring member 21. Since the spring member 21 is operative between the motor 19 and the carrier frame 9, the roller 20 to be driven by the motor 19 is kept against the upper frame portion 4, so that, when the motor is driven, this roller is moved along the upper side of the upper frame portion 4, and consequently also the entire carrier frame 9. A sensor 22, which e.g. includes a laser, is connected to the supporting element 13 which, taken relative to the milking parlour, is the rearmost one. With the aid of this sensor 22 it is possible to direct the milking robot from a rest position into the longitudinal direction of the milking parlour to a start position, from which the arms of the milking robot are moved to under the animal present in the milking parlour, and to follow the movements of the animal in the longitudinal direction of the milking parlour. To that end, the sensor 22 co-operates with a supporting element 23 which is movable

against the rear side of the animal. With the aid of a system of rods, which in the present design is constituted by a quadrangular construction, more specifically a parallelogram construction 24, this supporting element 23 is disposed on the milking parlour floor in such a manner that it is pivotal with respect thereto. Via two rods 25, the supporting element 23 is provided with a plate 26 which is arranged laterally beyond the frame portions 4 and 5 and is positioned such that it can reflect a signal transmitted by the sensor 22. After the reflected signal has been received by the sensor 22, this sensor supplies a control signal which is a measure of the actual, i.e. measured, distance between the plate 26 and the sensor 22; the motor 19 can be controlled by this control signal, whereby the milking robot 8 can be directed in such a manner in the longitudinal direction of the milking parlour that the distance between the plate 26 and the sensor 22 can be adjusted to, or maintained at, a preset value. When the milking robot 8 is in its rest position, it has been brought into a position which is farthest possible to the rear with respect to the frame portions 4 and 5, in which situation the milking robot 8 pushes via a contact element 27 against the plate 26 and thus pushes the supporting element 23 to and keeps it in a position which is farthest possible to the rear. In other words, the supporting element 23 is locked by the milking robot 8 when the latter is in the rest position. When the milking robot is directed from this rest position into the longitudinal direction of the milking parlour to the start position, from which the arms of the milking robot are moved to under the animal present in the milking parlour, then the supporting element 23 is unlocked and is pushed under spring pressure, by means of a spring disposed between the parallelogram construction 24 and the railing 2, against the rear side of the cow then present in the milking parlour. Even though the cow advances or retreats, the supporting element 23 will always remain pushed against the rear side of the animal under the action of the spring 28, so that the position of the plate 26 determines the position of the animal in the milking parlour in the longitudinal direction and so that, by means of the sensor 22, while keeping the distance in the longitudinal direction between the plate 26 and the sensor 22 constant, the milking robot can follow the movements of the cow in the longitudinal direction of the milking parlour. In the present design, the beam 11 of the carrier frame 9 extends downwardly in the vertical direction to just below the second frame portion 5. The bottom end of this beam 11 is provided with a horizontal rearwardly extending strip 29, onto which a freely rotatable roller element 30 is disposed. The lower frame portion 5 is constituted by a rail, more specifically by a rail in the form of a U-shaped beam, the freely rotatable roller element 30 being arranged so as to be movable between the two upright edges of the U-shaped beam. Thus, the milking robot 8 bears on the lower frame portion 5 and, when the milking robot 8 is moved along the first frame portion 4 by means of the motor, it can travel easily along the second frame portion 5. In addition to the carrier frame 9, the milking robot includes a robot arm construction 31 which is movable in a predominantly vertical direction relative to the carrier frame 9 by means of an operating cylinder 32. The robot arm construction 31 is connected movably to the carrier frame 9 by a quadrangular construction 33. In the embodiment shown, the upper arm 34 of this quadrangular construction 33 is of a fixed length, whereas the lower arm 35 thereof is adjustable in length, as a result of which the orientation of the robot arm construction 31 can be adjusted to a limited extent. The robot arm construction 31 comprises a predominantly vertical robot arm 36 as well as robot arms 37 which are capable of movement in a predominantly horizontal plane. The robot arm 36 is connected to the beam 11 of the carrier frame 9 via the quadrangular construction 33. The operating cylinder 32 is operative between the carrier frame 9 and the robot arm 36. Since the orientation of the robot arm 36 is adjustable to some extent by means of the lower arm 35 of the quadrangular construction 33, the position in which the operating cylinder 32 acts on the robot arm 36 is spatially not completely determined. For this reason, the housing of the operating cylinder 32 is arranged on a carrier plate 38 attached to the beam 10 of the carrier frame 9 so as to be pivotable to a limited extent. On this carrier plate 38 there are disposed supports 39, between which the housing of the operating cylinder 32 can move about a pivot shaft 40. In the present embodiment, the operating cylinder is designed as a servo-pneumatic positioning cylinder. This means that, connected to the lower end of the piston rod 41 via a plate 42 rigidly connected thereto, there is present a position feedback rod 43, by means of which in the portion 57 of the operating cylinder by a potentiometer there is derived a signal indicating the position of the piston rod relative to the cylinder housing, while by means of the signal supplied by this potentiometer the position of the piston rod relative to the cylinder housing can be adjusted to a preset position. The operating cylinder 32 is furthermore provided with an overload protection device, so that, as soon as the animal present in the milking parlour exercises force on the robot arm construction 31, e.g. by hitting it with one of its legs, the robot arm construction 31 can be moved to its lowest position. Figures 2 and 4 show the milking robot 8 in the rest position, in which it has been moved farthest

possible to the rear relative to the frame portions 4 and 5, and in which the robot arm construction 31 is brought to the lowest possible position above the soil. When the cow is present in the milking parlour and the milking procedure is to be started, the milking robot 8 is moved from the rest position into the start position, i.e. into the position in which the arms of the milking robot 8 can be moved to under the cow.

In the present embodiment, for this purpose the milking robot is provided with arms 44, 45 and 46. The arms 44 and 45 are disposed at a fixed angle of 90° relative to each other. Consequently, the arms 44 and 45 are moved jointly, more particularly by an operating cylinder 47 which is disposed between a supporting plate 48 attached to the robot arm 36 and a connection member 49 provided between the two arms 44 and 45. The two arms 44 and 45 are pivotal about a predominantly vertical pivot shaft 50 arranged between the supporting plate 48 and a supporting plate 48A, which latter plate is also rigidly connected to the robot arm 36, more specifically to the lower end thereof. With respect to the arm 45, the arm 46 is pivotable about a predominantly vertical pivot shaft 51 by means of an operating cylinder 52, which is arranged between the arm 46 and the end of the arm 45 located near the connection member 49. Near the end of the arm 46 there are fitted the teat cups 53 and 54 which are connectable to the teats of the cow. Between the two teat cups 54 there is provided a slide which is movable on the arm 46 and carries a sensor 55 which can determine accurately the position of the teats by a sector-sequential scanning motion, whereby the operating cylinders 32, 47 and 52 can be controlled such by a computer that the teat cups can be connected properly to the teats. When the robot arms 44 to 46 have been moved to under the cow, these arms are located in a relatively low position wherein the teats will not yet be detected by the sensor 55. By means of the operating cylinder 32, the robot arms 44 to 46 are now moved upwardly in steps until the sensor 55 detects one or more teats of the animal. Should during this upward movement the robot arms 44 to 46 have arrived in such a high position that the upper end of the sensor 55 pushes against the cow's abdomen, then a switch 56 located at the upper side of sensor 55 causes the robot arms to move downwards again, whereafter with the aid of the sensor 55 the determination of the position of the teats can be repeated, the robot arms being gradually moved upwards again in the process.

The invention is not limited to the embodiment described in the foregoing but also relates to all the details in the drawings, whether they have been described or not, and to all modifications in the construction in so far as they are within the framework of the appended claims.

Claims

1. An implement for milking animals, such as cows, comprising a milking parlour and a milking robot (8) for the automatic milking of animals, as well as a straight guide arranged in the longitudinal direction at the side of said milking parlour, the milking robot (8) being movable along said straight guide , characterized in that the straight guide, seen in plan view, includes two guide elements (4, 5) arranged above the ground at some distance from each other.

2. An implement as claimed in claim 1, characterized in that the two guide elements (4, 5) are located substantially above the ground.

3. An implement as claimed in claim 1 or 2, characterized in that the milking robot (8) bears on the two guide elements (4, 5).

4. An implement as claimed in any one of the preceding claims, characterized in that the milking robot (8), seen in the vertical direction, is arranged more closely to the ground than the guide elements (4, 5).

5. An implement as claimed in any one of the preceding claims, characterized in that the guide elements (4, 5), seen in the vertical direction, are arranged at some distance from the ground.

6. An implement as claimed in any one of the preceding claims, characterized in that the guide elements (4, 5) include a first frame portion (4) and a second frame portion (5) of a frame (3) disposed near a longitudinal side of the milking parlour.

7. An implement for milking animals, such as cows, comprising a milking parlour having at at least one longitudinal side thereof a fixedly arranged frame (3) including a first frame portion (4), to which a milking robot (8) for the automatic milking of animals is connected movably, characterized in that the frame (3) includes a second frame portion (5), against which the milking robot (8) bears and along whose bottom side milking robot arms (37) are movable under the animal present in the milking parlour.

8. An implement as claimed in any one of the preceding claims, characterized in that the first

frame portion (4) extends parallel to the second frame portion (5) and is located predominantly thereabove.

9. An implement as claimed in any one of the preceding claims, characterized in that there is provided a motor (19) for moving the milking robot (8) relative to the frame portions (4, 5).

10. An implement as claimed in claim 9, characterized in that the milking robot (8) includes a carrier frame (9) for the further portions of the milking robot (8) and the upper frame portion (4) is constituted by a rail, along which the carrier frame (9) can be moved with the aid of roller elements (16).

11. An implement as claimed in claim 10, characterized in that the carrier frame (9) extends from the upper frame portion (4) to approximately the height at which the lower frame portion (5) is located.

12. An implement as claimed in claim 10 or 11, characterized in that, at or near its two ends, the carrier frame (9) includes two roller element pairs (16), by means of which the carrier frame (9) is suspended from the upper frame portion (4) in such a manner that it is movable therealong.

13. An implement as claimed in any one of claims 9 to 12, characterized in that the motor (19) is arranged on the carrier frame (9), while furthermore a motor-driven roller (20) is provided, by means of which the carrier frame (9) can be moved along the upper frame portion (4).

14. An implement as claimed in claim 13, characterized in that the motor (19) is provided movably on the carrier frame (9) and includes a spring member (21) pushing the motor-driven roller (20) against the upper frame portion (4).

15. An implement as claimed in claim 14, characterized in that the motor-driven roller (20) is movable along the upper frame portion (4) and the spring member (21) is operative between the motor (19) and the carrier frame (9).

16. An implement as claimed in claim 14 or 15, characterized in that the roller (20) is provided with a rubber surface.

17. An implement as claimed in any one of the preceding claims, characterized in that the lower frame portion (5) is constituted by a rail, and that the carrier frame (9) of the milking robot (8) is provided with a roller element (30), by means of which the carrier frame (9), when it is moved along the upper frame portion, bears also on the lower frame portion (5).

18. An implement as claimed in claim 17, characterized in that the lower frame portion (5) is constituted by a U-shaped beam, while the carrier frame (9) is provided with a further roller element (30) which is disposed alongside thereof and is movable between the two upright edges of the U-shaped beam.

19. An implement as claimed in any one of the preceding claims, characterized in that the milking robot (8) includes a sensor (22), by means of which the milking robot (8) can be directed from a rest position into the longitudinal direction of the milking parlour to a start position, from which the arms (37) of the milking robot (8) are moved to under the animal present in the milking parlour, and the movements of the animal in the longitudinal direction of the milking parlour can be followed.

20. An implement as claimed in claim 19, characterized in that there is provided a supporting element (23) which is movable against the rear side of the animal and can cooperate with the sensor (22), i.e. in such a manner that, when the animal moves in the longitudinal direction of the milking parlour, the supporting element (23) is moved along and consequently, while preserving the supporting element-to-sensor distance in the longitudinal direction, the milking robot (8).

21. An implement as claimed in claim 20, characterized in that the supporting element (23) includes a plate (26) which is disposed such that it laterally extends beyond the frame portions (4, 5), and that from the actual distance between the plate (26) and the sensor (22) there is derived a control signal for the motor (19) to move the milking robot (8) into the longitudinal direction of the milking parlour, with the aid of which control signal the distance between the plate (26) and the sensor (22) is readjusted to a preset value.

22. An implement as claimed in claim 20 or 21, characterized in that the supporting element (23) is disposed on the milking parlour floor in such a manner that it is pivotal with respect thereto via a rod system.

23. An implement as claimed in claim 22, char-

acterized in that the rod system is constituted by a quadrangular construction, more specifically a parallelogram construction (24).

24. An implement as claimed in any one of claims 20 to 23, characterized in that, after having been unlocked, the supporting element (23) is pushed under spring pressure against the rear side of the animal present in the milking parlour.

25. An implement as claimed in claim 24, characterized in that the supporting element (23) is locked by the milking robot (8) when the latter is in the rest position.

26. An implement as claimed in claim 24 or 25, characterized in that the supporting element (23) is unlocked when the milking robot (8) is directed from the rest position into the longitudinal direction of the milking parlour to the start position, from which the arms (37) of the milking robot (8) are moved to under the animal present in the milking parlour.

27. An implement as claimed in any one of the preceding claims, characterized in that the milking robot (8) includes a carrier frame (9) which is connected movably to the upper frame portion (4) as well as a robot arm construction (31) which is movable in a predominantly vertical direction relative to the carrier frame (9) by means of an operating cylinder (32).

28. An implement as claimed in claim 27, characterized in that the robot arm construction (31) is connected movably to the carrier frame (9) by means of a quadrangular pivot construction (33).

29. An implement as claimed in claim 28, characterized in that one of the arms (35) of the quadrangular pivot construction (33), which forms the connection between the robot arm construction (31) and the carrier frame (9), is adjustable in length.

30. An implement as claimed in any one of claims 27 to 29, characterized in that the robot arm construction (31) includes a predominantly vertical robot arm (36) as well as robot arms (37) which are movable in a predominantly horizontal plane.

31. An implement as claimed in claim 30, characterized in that the operating cylinder (32) is operative between the carrier frame (9) and the predominantly vertical robot arm (36).

32. An implement as claimed in any one of claims 27 to 31, characterized in that the operating cylinder (32) is constituted by a servo-pneumatic positioning cylinder.

33. An implement as claimed in any one of claims 27 to 32, characterized in that the housing of the operating cylinder (32) is disposed pivotably on the carrier frame (9).

34. An implement as claimed in any one of claims 27 to 33, characterized in that the operating cylinder (32) includes an overload protection device, whereby, as soon as the animal present in the milking parlour exercises force on the robot arm construction (31), the latter can be moved downwardly.

35. An implement as claimed in claim 30 or 31, characterized in that near the end of the last robot arm (46) of the robot arm construction (31) there are provided thereon teat cups (53, 54) which are connectable to the teats of an animal present in the milking parlour as well as a sensor (55) for determining the position of the teats of the said animal.

36. An implement as claimed in claim 35, characterized in that the sensor (55) is accommodated in a housing provided on the last robot arm (46) and having at its upper side a contact switch (56), by means of which the milking robot (8), when it has arrived in such a high position under the animal in the milking parlour that it contacts the animal's abdomen, is moved downwardly again.

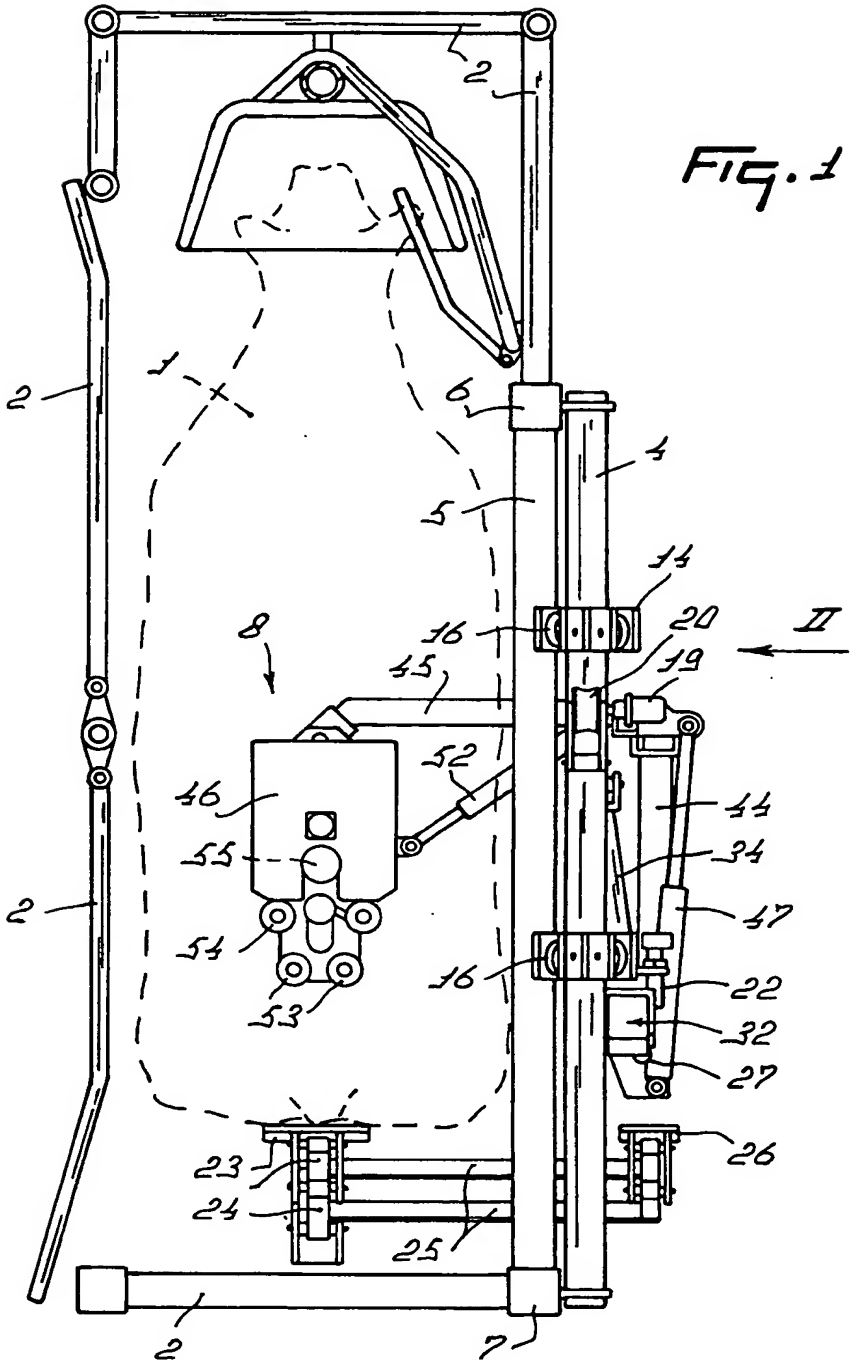
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FIG. 1

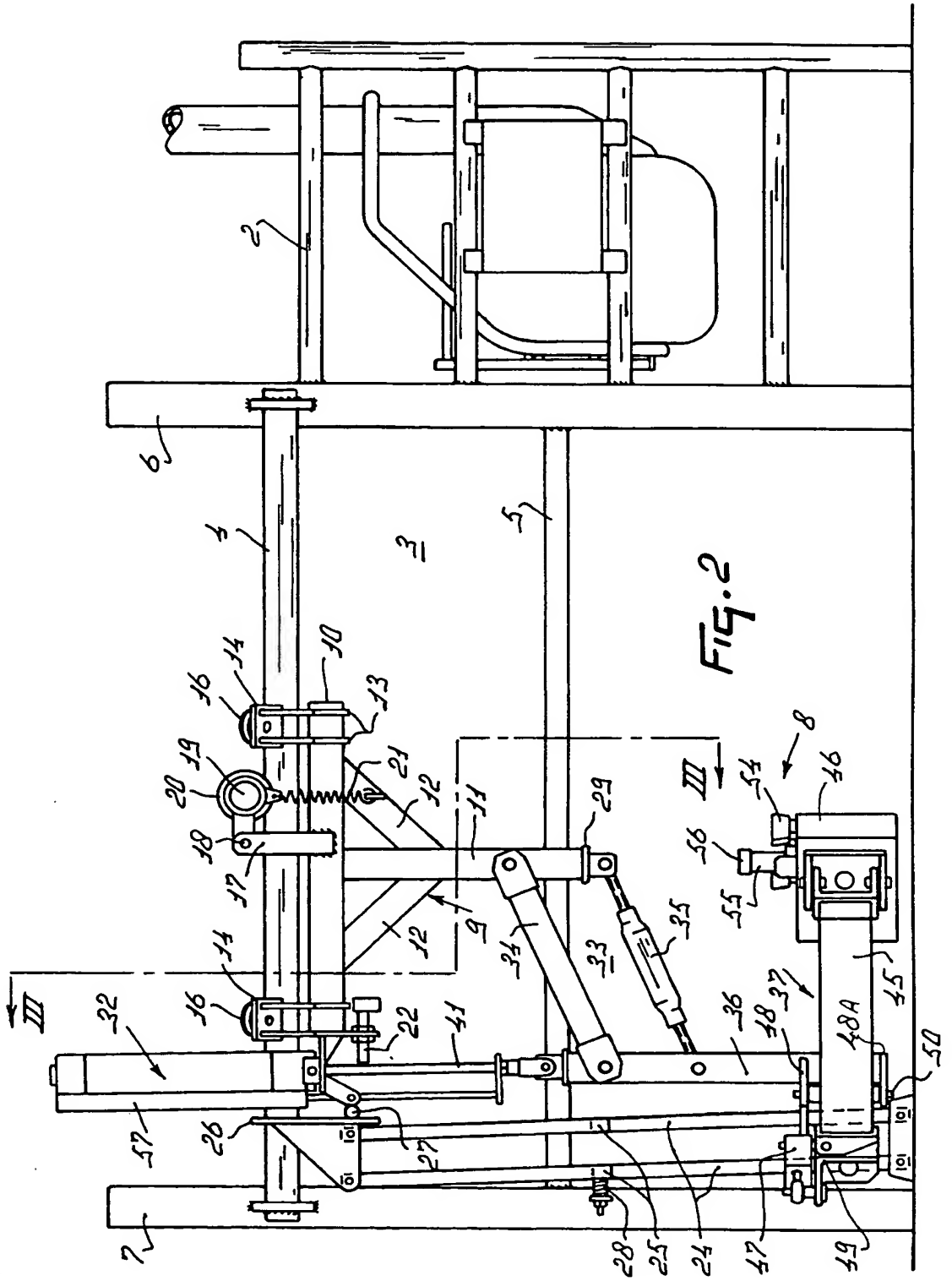
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FIG.2

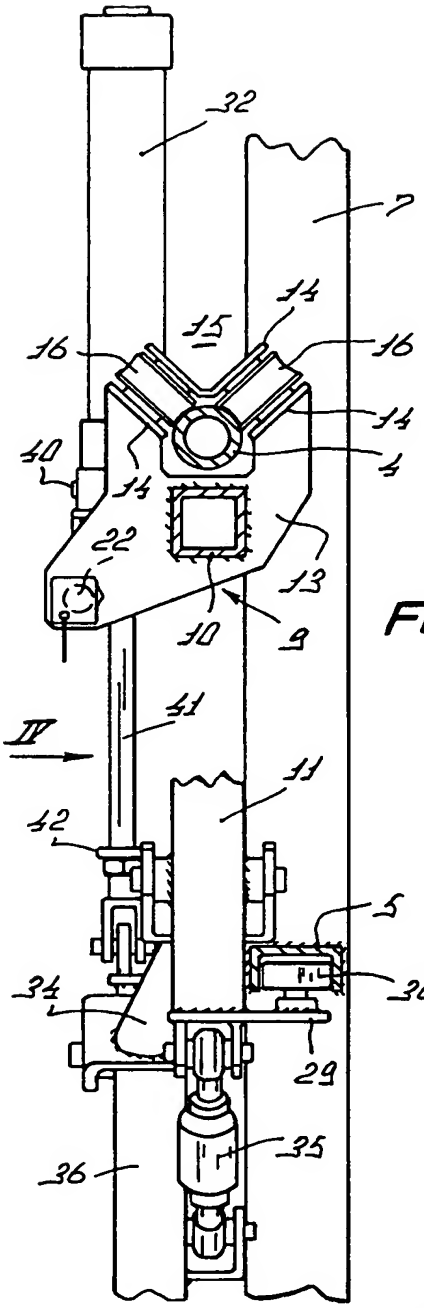

FIG. 3

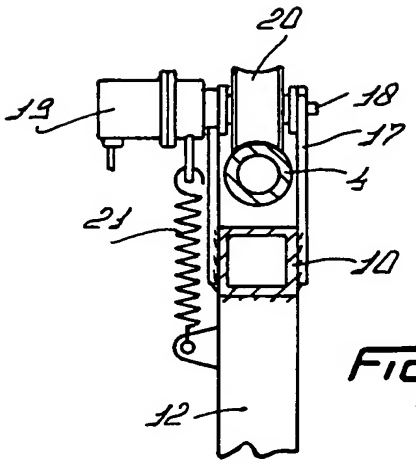

FIG. 5

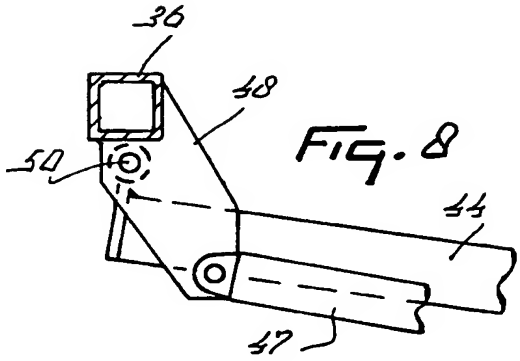

FIG. 8

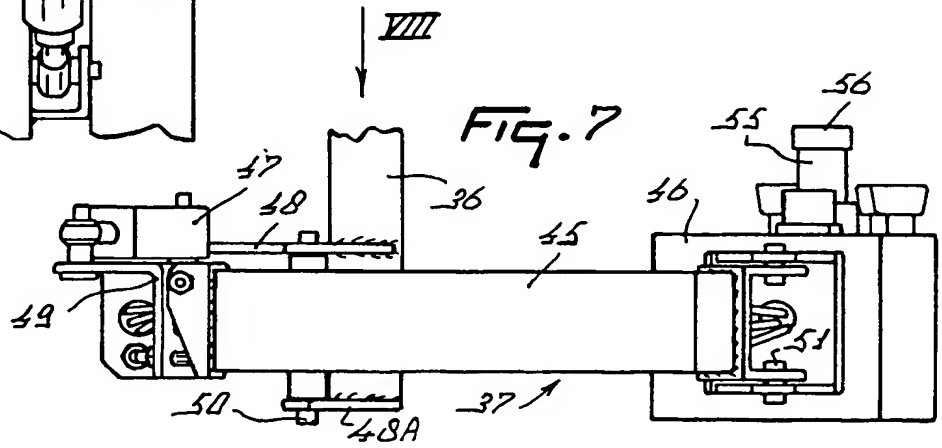

FIG. 7

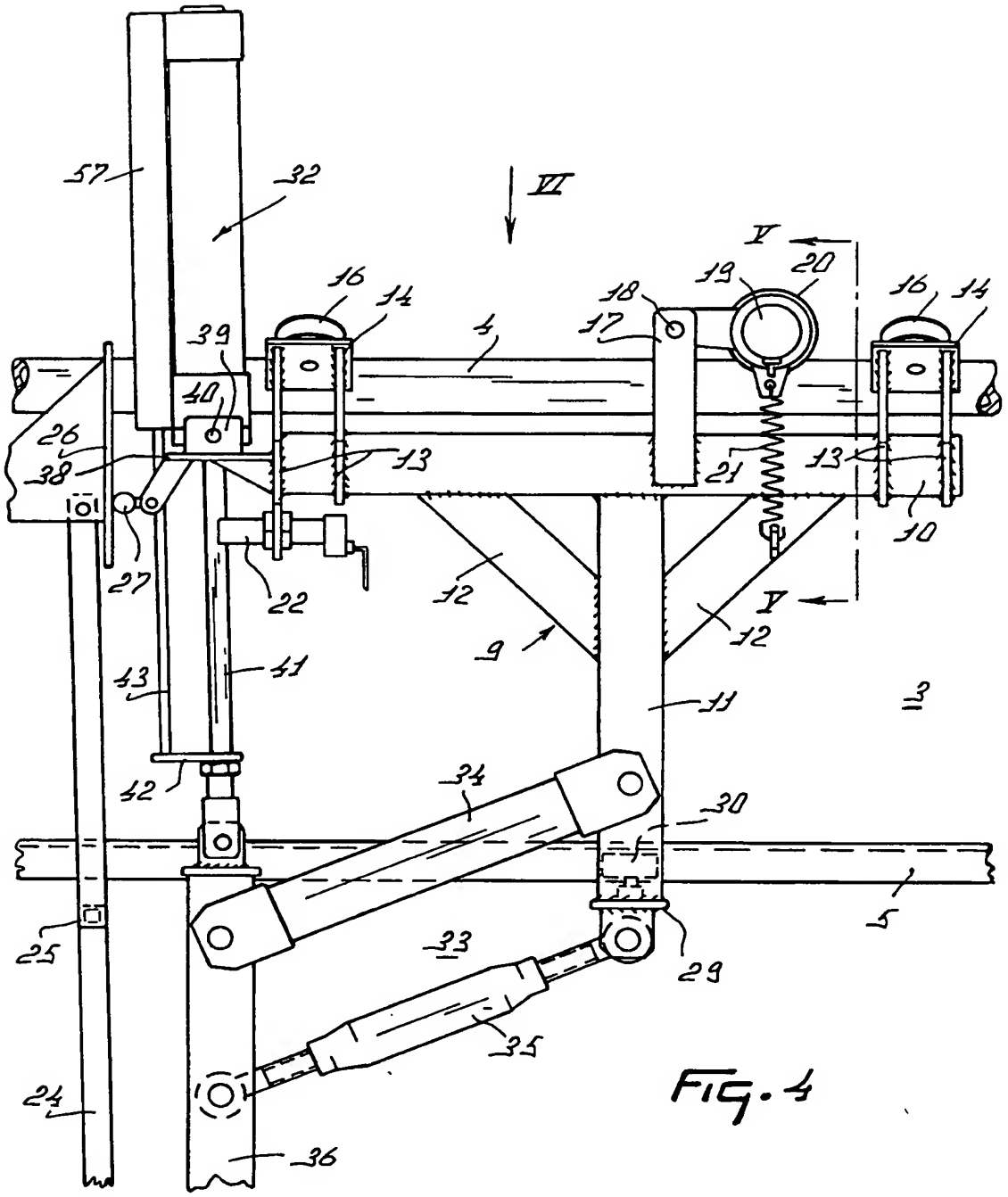
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FIG. 4

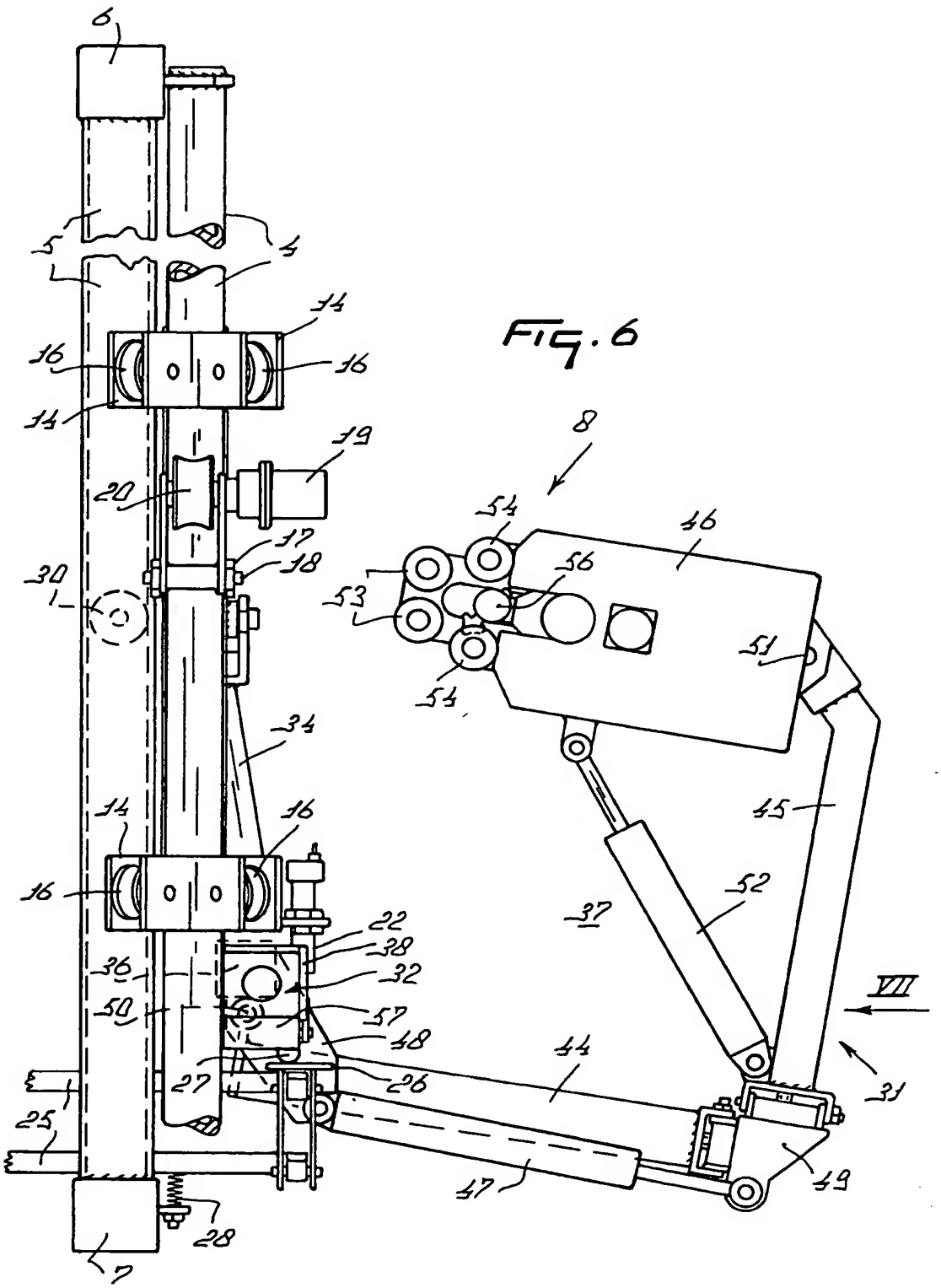
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FIG. 6

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EUROPEAN SEARCH REPORT

Application Number

EP 92 20 1630

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	LANDTECHNIK. vol. 45, no. 12, December 1990, HANNOVER DE pages 437 - 440 VON RUDOLF ARTMANN ET AL. 'ENTWICKLUNGSSTAND VON MELKROBOTERN' * page 439, left column, line 15 - line 27; figure 3 *	1-3,7-9, 19,27,30	A01J7/00
Y		4-6, 10-13, 17,19, 20,28, 31,32, 34-36	

Y	EP-A-0 323 875 (MULTINORM B.V.) * column 4, line 30 - line 44 *	4-6, 10-13, 17,28	
A		18	
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Y	EP-A-0 300 582 (C. VAN DER LELY N.V.) * column 11, line 48 - column 12, line 31 *	19,20,34	A01J
A		21-26	A01K

Y	EP-A-0 360 354 (C. VAN DER LELY N.V.) * column 7, line 39 - line 48; figure 1 *	31,32, 35,36	
A		19-26,33	

X	EP-A-0 300 115 (DÜVELSDORF & SOHN GMBH &CO.) * column 4, line 24 - line 29; figures 2,4 *	1	

	-/--		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	09 OCTOBER 1992	MARANGONI G.

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 232 568 (MULTINORM B.V.) * column 5, line 50 - column 7, line 22; figure 7 * * column 7, line 50 - column 8, line 55; figure 9 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)

The present search report has been drawn up for all claims

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